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(54) Title: MINERAL WOOL PLANT SUBSTRATE

(57) Abstract

Mineral wool plant substrate comprising a coherent matrix of mineral wool, with 99.9 to 75 wt.% mineral wool and 0.1 to 25 wt.% organic substance, preferably the organic substance and clay are included in the matrix in the form of a pellet, more preferably in the form of a mixed pellet.

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MINERAL WOOL PLANT SUBSTRATE

The present invention relates to a mineral wool plant substrate, more in particular to a mineral wool plant substrate comprising a foreign material in order to improve the properties of the mineral wool plant substrate.

Mineral wool plant substrates for plant growth are well-known in the art and consist of a coherent matrix of mineral wool. This coherent matrix is formed by collecting a layer of mineral wool fibres provided with a curable binder, so that after curing the mineral wool fibres are substantially not displacable relative to one another. If required for fast uptake of water this coherent matrix of mineral wool may be provided with a wetting agent.

As mineral wool may be used glass wool, stone wool, rock wool, or slag wool, and/or mixtures thereof.

The fibres may have an average diameter varying in between 1-10 μm. For rock wool the fibre diameter is on average about 4 μm.

The density of the coherent matrix of mineral wool may be between 10-200 kg/m^3, in general in between 30-80 kg/m^3.

Such a coherent matrix of mineral wool has a form retaining property, and is inherent due to the used inorganic starting materials. Furthermore, the water retaining capacity of this mineral wool plant substrates is very well controllable and predictable.

A disadvantage may be that during the plant growth initially the matrix reacts basic so that the pH increases.

It is a desire of growers to alleviate the afore-mentioned disadvantage, but above that to have the

possibility of controlling the exchange of nutrient cat ions.

Such properties are inherent to organic substances such as sphagum and peat. But these materials are unsuitable for use in mineral wool plant substrates because during culture they loose structure, and by biological degradation of the organic substance the water retaining capacity changes such that less air is included within the material resulting in a acidification of the plant substrate.

The present invention provides a mineral wool plant substrate that combines the benificial properties of both mineral wool and organic substances while avoiding substantially the disadvantages of these two materials.

According to the present invention is provided a mineral wool plant substrate comprising a coherent matrix of mineral wool, with 99.9 to 75 wt% mineral wool and 0.1 to 25 wt% organic substance.

By including up to less than 25 wt% organic substance in a coherent matrix of mineral wool it is avoided that by the degradation of the organic substance substantially the structure and the water retaining capacity as well as the acidification occur. Above that, due to the presence of the organic substance the pH decrease is overcome due to the buffering property of the organic substance.

In order to avoid substantially the effect of biological degradation of the organic substance it is preferred that the substrate comprises 99.5 to 90 wt% mineral wool and 0.5 to 10 wt% organic substance, preferably 99.5 to 95 wt% mineral wool and 0.5 to 5 wt% organic substance.

Suitable organic substances are sphagum and pressed peat as substantially biological non-degradable organic substances, and peat as such as a biological degrading organic substance. Using biologically degrading organic substances the mineral wool plant substrate provide further advantageous properties linked to the organic

substance, being the provision of a carbon source. Further, due to the degradation of the organic substance are released growth hormones, humic acids and vitamins which are beneficial to plant growth, and further chelate forming compounds which keep slight or insoluble trace elements in the nutrient solution. Accordingly, the plant growth is optimally promoted.

It is emphasized that due to the use of peat the cat ion exchange capacity is optimally improved.

When it is desired to provide a mineral wool plant substrate having properties in between mineral wool and organic substance, it is worthwhile to partially substitute the organic substance by an inorganic substance being a natural clay. This clay does not provide a carbon source or growth hormones and chelate compounds but provides an intermediate cat ion exchange capacity. Accordingly, clay may substitute the organic substance for up to 99%, generally for up to 50%, preferably for up to 25%. This means that clay may be present in amounts between 0.01 to 9.9 wt%, generally in between 0.2 - 3%, such as 0.2 - 1 wt%.

Clay for substitution of the organic substance may comprise soil materials comprising hydrofilic particles. For instance a particle size below 20 μm, belonging to the class of eroded minerals, such as clays, mixtures of clays with silt and sand having a clay fraction removable as sludge of at least 20%, and further bentonite, kaolin and the like. Particularly suitable are different naturally occuring types of clays of mixtures thereof, such as young see clay. Examples are clays comprising 0-100%, preferably 10-50%, most preferably particles smaller than 20 μm.

The use of clay provides another advantage when the organic substance is included in the matrix in the form of a pellet. Then, clay functions as a lubricating agent and as a material that reduces the compressability of the pellet. Accordingly, the amount of clay may be used in order to change the biodegradable character of the used

organic substance. Accordingly, peat which is normally biodegradable may be changed in partially to substantially bio-undegradable due to the addition of clay to the pellet. Accordingly, clay may inhibit or retard the biodegaration of the inorganic substance. The pellet may have a pellet size of about 2-10 mm.

Due to the presence of clay and of peat the concentration of spore elements in the water residing within the mineral wool matrix may be controlled, due to the sustained release of the cat ions temperarily stored within the organic substance and/or clay.

Examples of the mineral wool plant substrates according to the invention are the following.

Coherent matrices of mineral wool are provided having a density of about 50 kg/m^3 and an average fibre diameter of 4 μm. During the production of these plant substrates organic substance in the form of peat is added during the formation of the matrix of mineral wool prior to binder curing. After passing through a curing oven a coherent matrix is obtained.

Plant substrates according to the invention have been prepared comprising 5, 10 and 20 wt% peat, the remainder being mineral wool.

Other mineral wool plant substrates have been prepared comprising 15 wt% peat, 5 wt% clay and 80 wt% mineral wool.

Another plant substrate according to the invention comprised 1 wt% sphagum, 4 wt% clay and 95 wt% mineral wool.

The plant substrates have been used in the growth of plants and have shown an optimal control of the pH buffering, a sustained release of trace elements and of the water distribution. During culturing the biodegration of peat and sphagum resulted in a growth of mineral organisms providing growth promoting compounds to the plants.

CLAIMS

1. Mineral wool plant substrate comprising a coherent matrix of mineral wool, with 99.9 to 75 wt% mineral wool and 0.1 to 25 wt% organic substance.

2. Substrate as claimed in claim 1, comprising 99.5 to 90 wt% mineral wool and 0.5 to 10 wt% organic substance, preferably 99.5 to 95 wt% mineral wool and 0.5 to 5 wt% organic substance.

3. Substrate as claimed in claim 1, comprising clay substituting the organic substance for up to 99%.

4. Substrate as claimed in claim 3, comprising natural clay substituting organic substance for up to 50%, preferably for up to 25%.

5. Substrate as claimed in claim 1-4, wherein the organic substance comprises sphagum, pressed peat.

6. Substrate as claimed in claim 1-5, wherein the organic substance is biologically degradable, comprising peat.

7. Substrate as claimed in claim 4-6, wherein the organic substance and clay are included in the matrix in the form of a pellet, preferably in the form of a mixed pellet.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A01G31/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A01G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 91 08662 A (ROCKWOOL INTERNATIONAL) 27 June 1991 see page 4, line 18 - page 5, line 15	1-3
X	WO 93 18642 A (ISOVER SAINT GOBAIN) 30 September 1993 see claims 1,7,8	1,2
X	WO 93 00797 A (GRODANIA) 21 January 1993 see claims 1,3	1,2

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Information on patent family members

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